

# Vehicle Interior Noise Prediction Using Energy Finite Element Analysis, Phase II

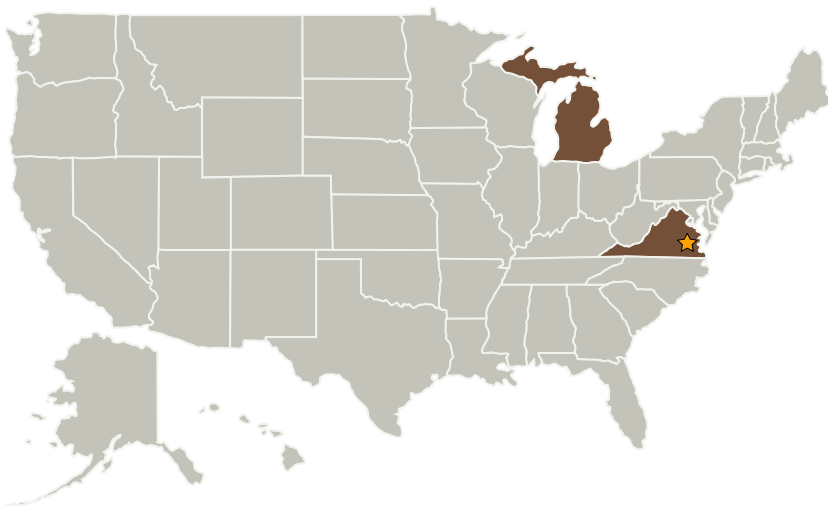
Completed Technology Project (2005 - 2007)



## Project Introduction

It is proposed to develop and implement a computational technique based on Energy Finite Element Analysis (EFEA) for interior noise prediction of advanced aerospace vehicles that will expand NASA's noise prediction capability at the early stage of design process. In many situations, aerospace structures are subjected to high frequency mechanical and/or acoustic excitations. Presently, noise performances of these products are determined experimentally, which is not feasible at the early design stage or by using computational simulation technique based on Statistical Energy Analysis (SEA). SEA requires high level of analyst expertise and in some instances, testing of the product's components. An alternative computational simulation technique for high frequency vibration and noise prediction based on EFEA conceptually offers several unique features. EFEA can predict the spatial variation of the energy in structures and the acoustic cavities. Local power input and damping treatments can also be modeled in EFEA. More importantly, EFEA is based on extensively used and comprehensively developed finite element method. The use of finite element method for both low and high frequency noise and vibration problems will provide the users a unified framework for the resolution of problems where the frequency spans a wide range.

## Primary U.S. Work Locations and Key Partners



Vehicle Interior Noise Prediction  
Using Energy Finite Element  
Analysis, Phase II

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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission  
Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Small Business Innovation  
Research/Small Business Tech  
Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Comet Technology Corporation	Supporting Organization	Industry	Ann Arbor, Michigan

## Primary U.S. Work Locations

Michigan	Virginia
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.5 Structural Dynamics
    - └ TX12.5.2 Vibroacoustics